DESCRIPTION

Gas heating device

[001] The invention relates to a gas heating device comprising a gas burner, a combustion chamber for the flames of the gas burner and a convection air conduit provided with an air outlet for evacuating a convection air stream that has been heated in the gas heating device.

[002] A generic gas heating device is known from GB 2 183 329 A. The gas heating device comprises a gas burner provided with a burner plate and a combustion chamber in which the gas burns. The combustion chamber is located between the burner plate and a heat-resistant, transparent glass pane. Exhaust gases produced in the combustion chamber are guided through an exhaust gas pipe to an exhaust gas connection. A convection air stream produced in the gas heating device comes indirectly in contact with the exhaust gas stream by means of a heat exchanger and is then released into the room to be heated.

[003] The object of the invention is to provide a gas heating device which can be used for various application purposes.

[004] The object of the invention is achieved by a gas heating device having the features of claim 1. According to the characterising part of claim 1, the combustion chamber of the gas burner is in fluid-dynamic communication with the convection air conduit for mixing an exhaust gas stream with the convection air stream. According to the invention, a fixedly installed exhaust gas connection for an additional exhaust gas pipe for evacuating exhaust gas can thus be dispensed with. As a result, the gas heating device can be embodied as suitable for mobile use. At the same time, as a result of the direct mixing of the exhaust gas stream with the convection air stream, a better heating efficiency of the gas heating device can be achieved. An additional heat exchanger connected between the exhaust gas pipe and the convection air conduit can thus be dispensed with.

[005] The mixing of the exhaust gas stream with the convection air stream is important according to the invention. This takes place as a result of the fluid-dynamic communication of

the combustion chamber with the convection air conduit. This means on the one hand that the exhaust gas stream is already mixed with the convection air stream inside the gas heating device. However, the subject matter of claim 1 also includes mixing of the exhaust gas stream with the convection air stream after this has left the gas heating device.

[006] In order that using the gas heating device in closed rooms does not present any health risk, largely low-emission combustion is to be ensured. Such low-emission combustion can be achieved by providing at least one swirling element in the combustion chamber to adjust the residence time of the secondary air in the area of the gas burner. Combustion with a suitable oxygen content can thus be carried out. The swirling element can preferably surround the gas burner in a funnel shape. In this case, the swirling element can be embodied simply in terms of production engineering as a deep-drawn steel sheet. The funnel-shaped steel sheet at the same time forms a combustion chamber for the flames of the gas burner.

[007] It is advantageous if the air supply duct and/or the air outlet duct are arranged substantially perpendicularly in the gas heating device whereby a chimney effect can be improved so that a more efficient convection air stream can take place.

[008] From the combustion technology viewpoint, it is favourable if the gas burner is constructed with a burner plate, in particular made of ceramic material, provided with a plurality of flame outlet openings. As a result of the plurality of smaller flames, a very large reaction area is obtained for an efficient air supply to the flames. At the same time, the burner plate can serve as an infrared emitter.

[009] The combustion chamber or the convection air conduit can be at least partly delimited by a heat-resistant glass or glass ceramic plate for thermal radiation. The glass or glass ceramic plate can advantageously be arranged in the direction of the thermal radiation of the gas burner. As a result, the surroundings of the gas heating device can be heated not only by means of the convection air stream but also additionally by thermal radiation. This is particularly important when using the gas heating device in the open air since the convection stream can only be used to a subordinate extent for heating in the open air. As a result, the gas heating device can not only be used for effective heating inside closed rooms but also in the open air.

[010] Preferably at least one flow guiding element can be provided in the convection air stream. As a result, the convection and/or exhaust gas stream can be guided inside the gas heating device in such a manner than heat-sensitive locations of the gas heating device can be protected.

[011] The gas heating device can preferably have an installation area for a gas bottle. The gas heating device can thus also be used in a mobile fashion. At the same time, the gas heating device is independent of the gas supply network. The above effect is enhanced by constructing the gas heating device with rollers at the bottom.

[012] From the production engineering viewpoint, it is preferable if the gas heating device comprises a housing with a hood-shaped front housing portion. The usable interior space of the appliance housing can be enlarged appreciably by the hood-shaped front housing portion. At the same time, the front housing portion can additionally delimit the convection air conduit. In addition, air outlet openings and/or air inlet openings can be provided in the front housing portion to construct this as a multifunctional part. In this case, it is particularly preferable to manufacture the front housing portion as a deep-drawn part independently of the gas heating device. In this case, a window-like recess can also be provided simply from the production engineering viewpoint in the front housing portion, serving as a radiation window for any thermal radiation. In order to ensure that the gas heating device can also be used under conditions when the gas heating device is exposed to wind or rain, the window-like recess can be closed by means of a disk which is transparent to radiation.

[013] The convection air conduit can preferably be provided in the manner of a shaft between a dividing wall inside the gas heating device and the front housing portion. An air shaft having a large cross-section which intensifies the chimney effect is thereby produced simply from the production engineering viewpoint.

[014] The convection air stream in the gas heating device is further intensified if the air outlet is embodied at least in part at the top of the housing or in the housing front portion. In this case, it is preferable particularly for use outside enclosed spaces if a flow element is provided

between the gas burner and the air outlet which serves as rain protection for the gas burner. The air outlet can advantageously be formed from a plurality of small air openings or air slits. On the one hand, sufficient removal of heat from the gas heating device is achieved. On the other hand, sufficiently good wind protection is achieved as a result of the small flow cross-sections of the air openings or air slits.

[015] An exemplary embodiment of the invention is described hereinafter with reference to the appended figures. In the figures:

[016] Figure 1 is a perspective front view of a gas heating device according to the invention; and

[017] Figure 2 is a side sectional view of the gas heating device along the plane I-I from Figure 1.

[018] Figure 1 shows a gas heating device comprising a housing 1 which has a hood-like front housing portion 3. Rollers 5 are mounted on the bottom of the housing. The front housing portion 3 is made of deep-drawn metal sheet and has a radiation window 7 at the front. The radiation window 7 is protected from contact by means of a grille 9. A burner plate 11 of a gas burner can be seen through the radiation window. The burner plate 11 has a plurality of small flame outlet openings 13 which are indicated in Figure 2. A deep-drawn lateral edge 15 of the hood-like housing front portion 3 is fixed to the housing 1. Air outlet openings in the form of two rows of slits 17, 19 are formed in the upper area of the front housing portion 3. The first row of slits 17 is arranged at the front in an upper section of the housing portion 3 which is aligned obliquely upwards. The second row of slits 19 is constructed in an upper section of the peripheral lateral edge 15 of the housing portion 3. This produces a convection air stream I obliquely upwards (see Fig. 2). Control elements 21 are arranged on an upper side of the housing 1 as shown in Figure 1.

[019] In the lateral sectional view as shown in Figure 2, an interior of the housing 1 is divided by means of a dividing wall 23 into an installation compartment 25 as well as a front air shaft 27. A gas bottle 29 together with its relevant gas fittings is arranged in the installation

compartment 25 and is connected to the control elements 21 by means of a gas supply pipe 31. The front air shaft 27 forms the convection air conduit. For this purpose, the housing 1 has air inlet openings 33 for supplying a convection air stream at the bottom which emerges from the gas heating device through the two upper rows of slits 17, 19. Inside the air shaft 27 a gas burner 35 is mounted on a mounting plate 37 which is affixed to an inner housing wall. The gas burner comprises a mixing chamber 39 which is closed by means of the burner plate 11. The mixing chamber is connected to the gas pipe 31. A gas nozzle is connected at a distance in front of the mixing chamber 39 so that the gas stream entrains primary air into the mixing chamber 39.

[020] On the flame outlet side of the gas burner 35, the gas burner is surrounded by a funnel-shaped deep-drawn steel sheet 41. The funnel-shaped steel sheet 41 forms a combustion chamber 42 for the flames of the gas burner 35. In addition, the steel sheet 41 induces swirling of the convection air stream I in the area of the flame outlet openings 13 of the gas burner. In this way a secondary quantity of air can be adjusted in the combustion chamber 42 for low-emission combustion of the gas. An electronic ignition device 43 is held in a lower area of the deep-drawn steel sheet 41.

[021] The air shaft 27 in Figure 2 is divided into a first air shaft 45 and a second air shaft 47. In the first air shaft 45, in addition to the convection gas stream I, an exhaust gas stream A is conveyed to the two rows of slits 17, 19 so that a comparatively hot convection air stream is present in the first air shaft 45. The second air shaft 47 is separated from the first air shaft 45 by means of an air baffle 49 and is located behind the gas burner 35. In the second air shaft 47 the temperature of the convection air stream I is far lower than in the first air shaft 45. The convection air stream I flowing in the second air shaft 47 is therefore used for cooling the control elements 21 as shown in the figure. Both the first air shaft 45 and the second air shaft 47 are in fluid-dynamic communication with the two rows of slits 17, 19.

[022] As shown in Figure 2, the front radiation window 7 is closed by means of a glass ceramic disk 51 which is transparent to radiation. As a result, thermal radiation from the burner plate 11 can pass through the glass ceramic disk 51 from the gas heating device. The

gas heating device therefore heats not only by means of the convection air stream but also by means of the thermal radiation coming from the radiation window.

[023] In order to put the gas heating device into operation, the gas-air mixture emerging from the flame outlet openings 13 is first ignited automatically. After successful ignition, a convection air stream I is obtained through the air outlet openings 33 at the bottom. The convection air stream I on the one hand supplies the gas burner with primary air which flows together with the gas into the mixing chamber 39. At the same time, the convection air stream I supplies the flame carpet of the burner plate 11 with a secondary air stream II. The exhaust gas stream A is automatically entrained by the convection air stream I and conveyed through the rows of slits 17, 19 from the gas heating device.